



COMMONWEALTH of VIRGINIA

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MEMORANDUM

TO: Health Directors

FROM: Suzanne R. Jenkins, V.M.D., M.P.H.
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SUBJECT: Drinking water and Cryptosporidium

For those of you who have waterworks in your District that will be affected by the Environmental Protection Agency (EPA) Information Collection Rule (ICR) under the Safe Drinking Water Act (see attached), it is time to start making plans for the possibility of finding *Cryptosporidium* oocysts in the drinking water. The ICR requires, among other things, that public water systems using surface water and serving populations over 100,000 monitor their source water for *Giardia*, *Cryptosporidium*, viruses, fecal coliforms or *Escherichia coli* and total coliforms. When pathogen levels exceed one pathogen per liter in the source water, finished water will have to be monitored. For systems serving between 10,000 and 100,000 only the source water will be monitored. The ICR will probably go into effect some time next year if difficulties with laboratory procedures can be overcome.

Despite problems with lack of standardization of tests for *Cryptosporidium* oocysts in water, a long turn around time between submission and results, cross reactions with certain algae, and differentiating viable from non viable oocysts, EPA seems intent upon collecting the information. Such data will be available to the public and with the Milwaukee outbreak and a recent Dateline show on people's minds, the finding of oocysts in water is likely to be widely publicized. The health department could be criticized for either failing to react or over reacting by issuing a boil water notice.

Boil water notices should not be issued lightly. The negative aspects include economic losses (especially to food and beverage industries), erosion of public confidence, diversion of public health resources, burn injuries from boiling water, and increased use of bottled water which is less

stringently regulated and may be less safe than tap water. Some surveys have reported that 50-60% of surface water supplies contain *Cryptosporidium* and that as much as 50% of the time filtered water may have organisms identified in it. Limited testing of finished water from optimally run Virginia plants has been negative to date, but there is a strong likelihood that organisms will be reported in finished water of some plants in the future. The decision to boil water cannot be made simply on the finding of a few oocysts in the finished water.

Because each water treatment system is different, the criteria on which to base a boil water notice must be tailored to the particular system. Such decisions should be made jointly between the Health Director and the Office of Water Programs (OWP) Field Director. Factors to consider include: number and characteristics of the organisms, water turbidity, particle counts in water, presence of coliforms, changes in filter effluent, repeat test results, changes in source water quality, severe weather, environmental sources of contamination, and increased diarrheal illness in the community. Obviously we would like to prevent the latter rather than use it as a measure of water safety, but with the lag time between testing and results probably being weeks, we could have disease in the community before we know about oocysts in the water. That is why good plant monitoring is so important. The boil water notice should be based on an overall evaluation of the changes in the source water and plant function, as well as, the quality of the finished water.

A number of national and regional groups are grappling with these issues and in time more specific guidelines will probably be available. In the meantime, you should be working with your OWP Field Director to establish a relationship with your water utility officials, learn about their monitoring programs, enlighten key public officials, and develop public and medical education campaigns.

The public needs to be told that verifying the presence of oocysts in drinking water may not indicate an increased public health risk. We have probably been drinking water with oocysts for a long time. Illness occurs when the level of oocysts in the source water is high and the water treatment process is compromised. That has happened rarely, considering how much surface water is consumed in this country. Water treatment plants cannot, and were never intended to, produce sterile water. The plan will be to keep the level of oocysts low and make decisions on alternative sources of water on a case by case basis considering many factors, not just the presence of oocysts.

The medical community needs to be made aware of cryptosporidiosis and encouraged to test patients for it when appropriate. Physicians need to understand all the ways that cryptosporidiosis can be acquired. Physicians can begin now to help us get an idea of what the background of cryptosporidiosis is in the community so we can recognize an increase should it occur due to drinking water.

A special group of consumers, the immunocompromised, need to be addressed separately. They need to be advised of the possibility and significance of ingesting oocysts from properly treated water. There is a study that suggests the gall bladder may be a reservoir for *Cryptosporidia*. This raises the possibility of disease resulting from reactivation of the organism, rather than *de novo*. The immunocompromised and their physicians need information to help them decide between tap water, bottled water, boiled water, or the use of filters.

At a recent workshop on the prevention and control of waterborne cryptosporidiosis at the Centers for Disease Control and Prevention, the one thing that everyone agreed on was the necessity of educating the public and the medical community before the ICR goes into effect and that this education should be a cooperative effort between the utilities, public health, and community groups. The Offices of Epidemiology and Water Programs will be happy to provide you with appropriate information to help you begin this process. Next spring, the OWP is planning a number of regional, one day workshops on cryptosporidiosis for plant operators and health department personnel. Details will be sent to you later.

In the meantime, please do not hesitate to contact the following for information:

Office of Water Programs

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Cryptosporidiosis

What is cryptosporidiosis?

Cryptosporidiosis is a disease caused by a parasite called *Cryptosporidium parvum*. In 1993, the parasite contaminated the water supply system in Milwaukee, Wisconsin, and over 400,000 became ill with diarrhea after drinking the water.

Who can get cryptosporidiosis?

Anyone, but it may be more severe in persons with impaired immune systems such as persons with HIV/AIDS, persons undergoing chemotherapy for cancer or in persons who have had a kidney, heart or other organ transplant. It is also more common among children and staff in daycare centers.

Where is this parasite found?

Cryptosporidium is found in the stool of infected animals and humans. Any pet, farm animal or wild animal, including birds, fish, and reptiles, can become infected. Calves are the most likely animals to be infected. Infected animals or humans pass *Cryptosporidium* oocysts (egg-like forms of the organism) in their stools for weeks to months after infection.

How is cryptosporidiosis spread?

People or animals become infected by putting something in their mouth that has been contaminated with the stool of an infected person or animal. This may occur after touching something that was handled by an infected person who did not wash his hands after going to the bathroom and then putting your hand in your mouth. Persons and animals can also become infected by drinking water or eating raw or undercooked food contaminated with stool material from infected animals or humans. Some people have become sick after swimming in public pools contaminated with stools from infected persons.

What are the symptoms of cryptosporidiosis?

The major symptoms are watery diarrhea and abdominal cramping. Vomiting and low-grade fever may occur. Symptoms may come and go and generally last for two weeks, but may continue for a month. Many people do not have any symptoms.

Can cryptosporidiosis cause severe problems?

In persons who lack normal immune function, cryptosporidiosis can cause severe, life-threatening diarrhea and has been associated with liver and gall bladder disease. Persons at greatest risk for severe problems include those having HIV/AIDS infection, receiving cancer chemotherapy or taking drugs that suppress the immune system.

How soon after exposure do symptoms occur?

After swallowing the oocysts, illness may occur in about 2-10 days, usually around 7 days.

What should I do if I think I have cryptosporidiosis? How is the disease diagnosed?

See your physician as soon as possible, especially if your immune system is suppressed. If your doctor suspects cryptosporidiosis, you will be asked to submit a stool sample. Diagnosis is made by using special stains on the sample and then examining it under a microscope. Not all

laboratories have the capability or experience to do the test and it must be requested by the doctor.

Should infected people be excluded from school or work?

Since *Cryptosporidium* is passed in the stool, children and staff in daycare centers, health care workers, or people who handle food should not go to school or work while they have diarrhea. After diarrhea ends, most persons may return to work or school but they should carefully wash their hands after using the toilet, after changing a diaper, and before preparing food. The health department will assess each situation in which the person with cryptosporidiosis is a foodhandler, health care worker, or day care worker or attendee and make recommendations to prevent the spread of disease.

What is the treatment for cryptosporidiosis?

People with healthy immune systems usually get well on their own. People with diarrhea should drink plenty of fluids. Currently, there are no antibiotics proven to be effective, although one is being studied.

Can people who get cryptosporidiosis get it again?

It is unknown whether past infection means people are protected from getting it again.

How can cryptosporidiosis be prevented?

1. Avoid water or food that may be contaminated, including unwashed fruits or vegetables or unpasteurized milk. Do not drink water directly from streams, lakes, springs or any unknown source. If you suspect your drinking water is unsafe, bring it to a rolling boil for one minute prior to using.
2. Always wash hands with soap and water:
 - After using the toilet or changing diapers
 - Before handling food
 - After handling stools from animals
 - After gardening or other direct contact with soil
3. If you work in a child-care center where you change children's diapers, wash hands properly between each child. If you use gloves, change gloves between each child.
4. If you take care of cryptosporidiosis patients, wash hands after bathing patients, emptying bedpans, changing soiled linen, or otherwise coming in contact with the patients' stools.
5. If you have cryptosporidiosis, wash your hands often to prevent spreading the disease to other members of your household.
6. Persons with diarrhea should not use public swimming facilities.
7. Persons with suppressed immune systems should avoid activity that may involve contact with stool of humans or animals, including certain risky sexual activities.

Cryptosporidiosis and Drinking Water

In the past ten years, at least six outbreaks of cryptosporidiosis have been associated with contaminated drinking water, including the well-publicized one in Milwaukee, Wisconsin in 1993. This information sheet answers the most common questions that we receive about drinking water and cryptosporidiosis.

How do *Cryptosporidium* oocysts get into drinking water?

Cryptosporidium gets into surface water sources such as rivers and lakes from the stools of infected animals or people. Many municipal water treatment plants get their water from these surface water sources that can contain *Cryptosporidium* oocysts.

Does the treatment process remove the oocysts?

Filtration treatment will usually remove *Cryptosporidium* oocysts. Chlorination by itself is not effective. All Virginia localities that use surface water sources provide filtration treatment. The better the equipment and the more experienced the operators the less likely it is for oocysts to get through, but it is possible to have oocysts show up in drinking water that has been adequately treated.

What does it mean if *Cryptosporidium* oocysts are found in drinking water?

Authorities believe that the detection of a few oocysts in drinking water does not pose a threat to people with healthy immune systems. It takes an unusual combination of events to lead to a situation where drinking water causes disease. An increased number of organisms in the source water and a breakdown in the water treatment system would have to occur at the same time. This is the combination that occurred in Milwaukee.

How will officials decide that water is not safe to drink?

They will look at all indicators of water quality including such things as changes in the source water, number of *Cryptosporidium* oocysts, turbidity (cloudiness of the water), particle counts, presence of other organisms, water plant performance and maintenance records. The presence of oocysts alone does not necessarily indicate an increased risk for disease.

What will they recommend if water isn't safe?

Bringing water to a rolling boil for one minute will kill all organisms including *Cryptosporidium*.

What laws regulate *Cryptosporidium* in drinking water?

There are no federal or state regulatory standards for *Cryptosporidium* in drinking water because there is not enough information on which to base standards. In an effort to learn more, the Environmental Protection Agency will soon be requiring large and medium sized water systems that obtain their water from surface water sources to test for *Cryptosporidium* oocysts.

Are there any problems with the laboratory tests?

There are several things to be aware of regarding *Cryptosporidium* test results:

1. The laboratory test most commonly used to detect *Cryptosporidium* in water cannot tell the difference between viable (able to cause illness) and nonviable oocysts, but newer methods are being tested on selected water systems which will be able to identify viable oocysts.
2. In most cases, the results of the tests on drinking water will not be available until several weeks after the sample was taken and so will not be an accurate measure of present conditions.
3. The number or concentration of oocysts is not necessarily a predictor of when illness will occur. Other factors, such as clumping of oocysts and water temperature may play a role.

Has any water been tested in Virginia?

Yes. To date, in Virginia, levels of *Cryptosporidium* have been low in water before it enters the treatment plant and have not been found in filtered water.

who are Immunocompromised

What general precautions should I take to avoid this disease?

If you are HIV positive, undergoing chemotherapy, taking drugs for immune system suppression or otherwise immunocompromised, you should adhere strictly to the general preventive measures. Be extra careful about what you eat and drink. Be careful not to let raw foods contaminate other foods. Wash vegetables and fruits that will be eaten raw. Be a fanatic about hand washing, including after touching animals or working in the garden. Avoid accidentally swallowing water from lakes, rivers or swimming pools. Follow safer-sex guidelines.

What about my drinking water?

Current data are inadequate to recommend that all immunocompromised persons boil or avoid drinking tap water in non-outbreak settings. However, you may want to discuss the need for taking further protective measures with your medical provider because:

- Drinking water that is considered safe for persons with healthy immune systems may contain some *Cryptosporidium* oocysts;
- No one knows whether a few oocysts could create a risk for someone who is immunocompromised;
- Some researchers think that oocysts ingested while you are still relatively healthy may remain in your gallbladder until your immune system is severely depressed and then cause serious illness.

What are some options for safer beverages?

1. Bring tap water to a full boil for one minute before using.
 - This will kill all organisms including *Cryptosporidium*.
 - To avoid burning yourself, allow water to cool before pouring into clean, dry containers.
 - Taste can be improved by adding lemon or other flavorings.
 - Use the boiled water for ice cubes, toothbrushing and mixing with concentrates. You don't need to use boiled water for food that will be cooked before eating.
 - Dishes, silverware, pots and pans may be washed with tap water as long as

they are dry before being used.

2. Use a point-of-use (personal-use, end-of-tap, under sink) filter that will remove particles 1 micron or less in diameter.
 - Filters in this category include:
 - those that produce water by reverse osmosis,
 - those labeled as "Absolute" 1 micron filters, and
 - those labeled as meeting NSF (National Sanitation Foundation) standard #53 for "Cyst Removal".
 - The "Nominal" 1 micron filter rating is not standardized. Therefore, filters in this category may not be as good at removing oocysts.
 - Be sure to accurately follow directions for filter use and remember to replace the filters according to manufacturer's directions.
3. Use bottled water.
 - Be careful, because bottled water doesn't have to meet the same standards as water coming from a treatment plant.
 - If you can verify with the manufacturer that the water has been passed through filters capable of removing particles 1 micron or less in diameter or has undergone reverse osmosis prior to bottling, then it has been treated for the removal of *Cryptosporidium* oocysts.
4. Use distilled water, commercially bottled soft drinks and seltzers. Bottled juices are safe if they have been pasteurized and do not require refrigeration before opening.